# Description of the US Fish and Wildlife Service Klamath River Grab Sample Database

By

Randy Turner
US Fish and Wildlife Service
Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, CA 95521
(707) 822-7201

# Table of Contents

# 1.0 Purpose

This database was created to organize and archive a large quantity of sample results for water sample analyses conducted by the Arcata Fish and Wildlife Office for the period of 2001 to 2004. This document also serves the purpose of providing users a general guide of the content including general database structure and details of the field names, etc.

# 2.0 Data Entry and Quality Control

Data from the various laboratories was imported in electronic format into the database. AFWO did not assess data quality prior to incorporation into the database. Other supporting data including audits, QA and site information was entered into the database by hand.

# 3.0 Database Structure

The database is made up of four tables containing the following information, grab sample data, site information, discharge and grab data with corresponding Audit information. Queries can be set up to obtain data from any one or combination of the tables although none are provided here. Tables 3-1 through 3-4 provide definitions of the fields in each of the major tables. Section 3.1 to 3.4 further expound on the field names and descriptions.

## *3.1 Description of Grab Data Results Table*

The sections below describe the data included in each of the fields in the Grab Results 2001 to 2004 table.

Table 3-1. Description of GrabResults2001to2004 Fields

| **Field Name** | **Description** |
|---|---|
| SampleID | Site, Year and Run number (IG,02,4) along with analyte |
| Site | Site ID |
| Run Number | Number assigned to sample event. |
| Year | Sample year (eg. 01, 02, 03, 04) |
| Bottle Number | Bottle number of analyte |
| FieldSampleID | Site, Year, Run Number,"P", Bottle Number and QA/QC designation |
| QA/QC Type | O= Original, D= Duplicate, B= Blank, S= Spike, F= Filtered |
| Sample Date | Date sample was taken |
| Sample Time | Time churn sample was collected |
| Analyte | Analyte measured |
| Result | Laboratory result. ND= Non Detect |
| Numeric Qualifier | < is numeric result below reporting limit. > is sample exceeds measurable limit |
| Numeric Result | Numeric result only. Non detect results are shown as the reporting limit. |
| Units | Units |
| DF | Dilution Factor |
| MDL | Method Detection Limit |

| | |
|---|---|
| PrepDate | Date laboratory prepared sample |
| AnalDate | Date laboratory analyzed sample |
| LabBatchID | Sample batch identification |
| Method | EPA sample methodology |
| Lab Name | Laboratory performing sample |
| Workorder | Number applied at laboratory |
| LabSampleID | Number applied at laboratory |
| SiteYearRunNumber | Site, year, run number used to organize samples |
| QA/QC Special | QA/QC not including O for original. Used for sample organization |
| QA Check | Check box to double check Database data against data in Grab Results binder |
| RDL | Reported Detection Limit |

### 3.1.1 Sample ID, Site, Run Number, Year, Bottle Number, Field Sample ID, Analyte, Site Year Run Number

Sample identification was based on assigning codes to each site, run number, year, bottle number, analyte and quality control method. These codes were applied to each sample in order to provide a unique name for each result. In some instances sites names were updated through the years to prevent different names being used for the same site. These fields allowed for organizing the results in different ways depending on the analysis needed.

### 3.1.2 QA/QC Type, QA/QC Special, QA Check

Defines whether sample was a regular (original) sample or part of the QA process. These fields allow the database to sort all entries into specific records. QA Check allows records to be marked that have been double checked against the hard copy reports.

### 3.1.3 Numeric Result, Numeric Qualifier, Result, Units, Sample Date, Sample Time

The Numeric Result field holds all the results in number format so that statistics can be calculated. Any Results that were Non Detect are represented by the reporting limit within the Numeric Result field and apply the appropriate Numeric Qualifier (eg.< or >). The Units field holds all the associated units with the Result. The Date and Time fields hold the date and time that the sample was collected.

### 3.1.4 DF, MDL, RDL, Lab Batch ID, Workorder, Lab Sample ID

DF is dilution factor and signifies when a sample is diluted to reduce matrix interference. MDL is the Method Detection Limit and refers to the lowest level that North Coast Labs can report down to. This is similar to Reported Detection Limit, or RDL, but per the definition of our lead laboratory, they use MDL rather than RDL. Other labs use RDL. Lab Batch ID, Workorder and Lab Sample ID are codes applied by and used only by the laboratories for tracking purposes.

### 3.1.5 Prep Date, Anal Date, Method, Lab Name

Prep Date and Anal Date refer to the laboratories processing of the sample. It recognizes these dates in reference to specific hold time issues. Method is the specific EPA recognized process for producing sample results. This may change based on equiptment

used, or if a sample is contracted out to a different laboratory. Lab name recognizes the lab performing the given sample.

## *3.2 Descriptions of the Sites Table*

The sections below describe the data included in the each of the fields in the Sites table. This table provides background information on the sites that are sampled and information on other program work at these sites.

Table 3-2. Description of Sites Fields

| Field Name | Description |
|---|---|
| Site | Site abbreviation |
| Old Site Name | Other site abbreviations used in the past. |
| Site ID | Site code used within NCRWQCB water quality database. |
| Operator | Group collecting sample |
| Site Description | Detailed description of site |
| Discharge Location | Site code of discharge location applied to sample site. |
| Discharge Description | Site description with river mile |
| First Order RM | First order river mile of sample site or location of second order tributary mouth |
| Second Order RM | Second order river mile of sample site or location of third order creek mouth. |
| Third Order RM | Third order river mile of sample site |
| Elevation | Elevation in feet of sample site |
| Avg BP | Average barometric pressure of sample site to calibrate dissolved oxygen. |
| Latitude | Latitude in degrees, minutes, seconds |
| Longitude | Longitude in degrees, minutes, seconds |
| LatDD | Latitude in decimal degrees |
| LongDD | Longitude in decimal degrees |
| USGS Discharge | USGS discharge is measured at this site. |
| DataSonde 2001 | Sites with DataSonde data in 2001. |
| Temp Probe 2001 | Sites with independent water temperature probe data in 2001. |
| Air Temp 2001 | Sites with air temperature and relative humidity data in 2001. |
| Grab 2001 | Sites with grab samples in 2001. |
| DataSonde 2002 | Sites with DataSonde data in 2002. |
| Temp Probe 2002 | Sites with independent water temperature probe data in 2002. |
| Air Temp 2002 | Sites with air temperature and relative humidity data in 2002. |
| Grab 2002 | Sites with grab samples in 2002. |
| DataSonde 2003 | Sites with DataSonde data in 2003. |
| Temp Probe 2003 | Sites with independent water temperature probe data in 2003. |
| Air Temp 2003 | Sites with air temperature and relative humidity data in 2003. |
| Grab 2003 | Sites with grab samples in 2003. |
| DataSonde 2004 | Sites with DataSonde data in 2004. |
| Temp Probe 2004 | Sites with independent water temperature probe data in 2004. |
| Air Temp 2004 | Sites with air temperature and relative humidity data in 2004. |
| Grab 2004 | Sites with grab samples in 2004. |

### 3.2.1 Site, Site Description, Site ID, Old Site Name, Operator

Site is a abbreviation of the sample location with Site Description providing background information on the location. Site ID is a field that uses a standardized Site code that is used by other agencies and groups in the basin. This is based on the first two letters of

the stream being sampled followed by the river mile (to the hundredths place). Previous efforts have had different site names and this field provides any old names for reference. Operator is the tribe or agency performing the sampling.

### 3.2.2 Discharge Location, Discharge Description, USGS Discharge

Discharge Location provides the code for the appropriate USGS discharge location to allow the application of flow data to grab results. This can be used to generate loading estimates. Discharge Description provides the location from the USGS including river mile of the gage site. USGS Discharge refers to whether the sample site is also a USGS gage site.

### 3.2.3 Latitude, Longitude, LatDD, LongDD

These fields define latitude and longitude in both degrees, minutes, seconds and Decimal Degress (DD).

### 3.2.4 First Order RM, 2nd Order RM, 3rd Order RM, Elevation, Avg BP

First Order RM refers to the river mile at which the sample site or tributary meets the Klamath River. Second Order RM (and Third Order etc.) refers to the sample site of its tributary stream. Elevation is at the sample site and Avg BP is generated from the elevation. This has value for calibration of dissolved oxygen probes on site.

### 3.2.5 DataSonde 2001, 2002, 2003, 2004

These fields provide information on whether monitoring was done at each site in the appropriate year with a DataSonde. This device continuously monitors water temperature, specific conductance, pH and dissolved oxygen (mg/L and % Saturation)

### 3.2.6 Temp Probe 2001, 2002, 2003, 2004

These fields provide information on whether monitoring was done at each site with an independent temperature probe. This device continuously monitors water temperature and can be deployed for long periods of time without maintenance.

### 3.2.7 Air Temp 2001, 2002, 2003, 2004

These fields provide information on whether monitoring was done at each site with an independent air temperature/ relative humidity probe. This device continuously monitors air temperature and relative humidity and can be deployed for long periods of time without maintenance. This data is useful to understand weather patterns and its effects on water temperature, etc.

### 3.2.8 Grab 2001, 2002, 2003, 2004

These fields provide information on whether grab samples were performed at each site in the appropriate year. This information can identify which sites may have relevant data for the time period in question.

## *3.3 Description of the Discharge Table*

The sections below describe the data included in the each of the fields in the Discharge table.

Table 3-3. Description of Discharge Fields

| Field Name | Description |
|---|---|
| Site | Site where flow was taken |
| Date | Date of flow |
| Discharge (cfs) | Average daily discharge in cubic feet/ second |
| Flag | Note any special circumstances for data (e= estimated record, 1=rounded) |
| Agency | Agency collecting flow data |
| Comments | Comments |

### 3.3.1 Site, Date, Discharge

Site is an abbreviation of the sample location with Site Description providing background information on the location. Discharge is the average daily value in cubic feet per second (cfs).

### 3.3.2 Flag, Agency, Comments

Flags are applied when the data is modified by the collecting agency during review. Agency refers to the group collecting and processing the data, normally USGS. Comments may recognize provisional data or other situations. General comments included with the datasets were incorporated in the Comments field.

## *3.4 Explanations of the Grab Results with Audit Table*

The sections below describe the data included in the each of the fields in the Grab Results with Audit 2001 to 2004 table. This table provides background information on the sites that are sampled and information on other program work at these sites.

Table 3-4. Description of Grab Results with Audit 2001 to 2004 Fields

| Field Name | Description |
|---|---|
| Sample ID | Site, Year and Run number (IG,02,4) along with analyte |
| Site | Site abbreviation |
| Run Number | Number assigned to sample event. |
| Year | Sample year (eg. 01, 02, 03, 04) |
| Bottle Number | Bottle number of analyte |
| Field Sample ID | Site, Year, Run Number,P, Bottle Number and QA/QC designation if applicable |
| Sample Date | Date sample was taken |
| Sample Time | Time churn sample was collected |
| Analyte | Analyte measured |
| Result | ND= Non Detect |
| Numeric Qualifier | < is numeric result below reporting limit. > is sample exceeds measurable limit. |
| Numeric Result | Numeric result only. Non detect results are shown as the reporting limit. |
| Temp_Q | Water temperature measured from handheld sonde. |
| SpCond_Q | Specific conductance measured from handheld sonde. |
| pH_Q | pH measured from handheld sonde. |
| DO_Q | Dissolved oxygen concentration measured from handheld sonde. |

| | |
|---|---|
| DO%_Q | Dissolved oxygen percent saturation measured from handheld sonde. |
| QA/QC Special | QA/QC not including O for original. Used for sample organization |
| QA/QC Type | O= Original, D= Duplicate, B= Blank, S= Spike |

### 3.4.1 Sample ID, Site, Run Number, Year, Bottle Number, Field Sample ID, Sample Date, Sample Time, Analyte, Result, Numeric Qualifier, Numeric Result, QA/QC Special, QA/QC Type

See descriptions for these fields within 3.1.1 to 3.1.3.

### 3.4.2 Temp_Q, SpCond_Q, pH_Q, DO_Q, DO%_Q

These fields describe audit information taken during the sample event. Information is generally taken with a Hydrolab Quanta, a handheld multiprobe instrument which measures the above constituents. Data is recorded within five minutes of collection of the churn and helps to describe physical conditions of the water at the time of collection.

## 4.0 Limitations of the Databases

The database currently does not have the ability to produce graphics of the results. This would be a worthwhile addition and provide a better way to evaluate the data. Other limitations include problems with the Access format, lack of laboratory QA and ability to process and rate the data in a timely fashion. This limits our ability to provide a quick turn around to the public to disseminate the data.

## 5.0 Recommendations

Although every attempt has been made to provide good, usable databases the following steps could be taken to improve upon this effort:

- Incorporate laboratory QA into the database.
- Find ways to define data quality automatically based on QA/QC.
- Provide graphical reports based on site, year, run number, analyte, etc.
- Move the database into a server based program such as Sequel to provide more power and quicker queries.
- Link this data to the AFWO website for public use.